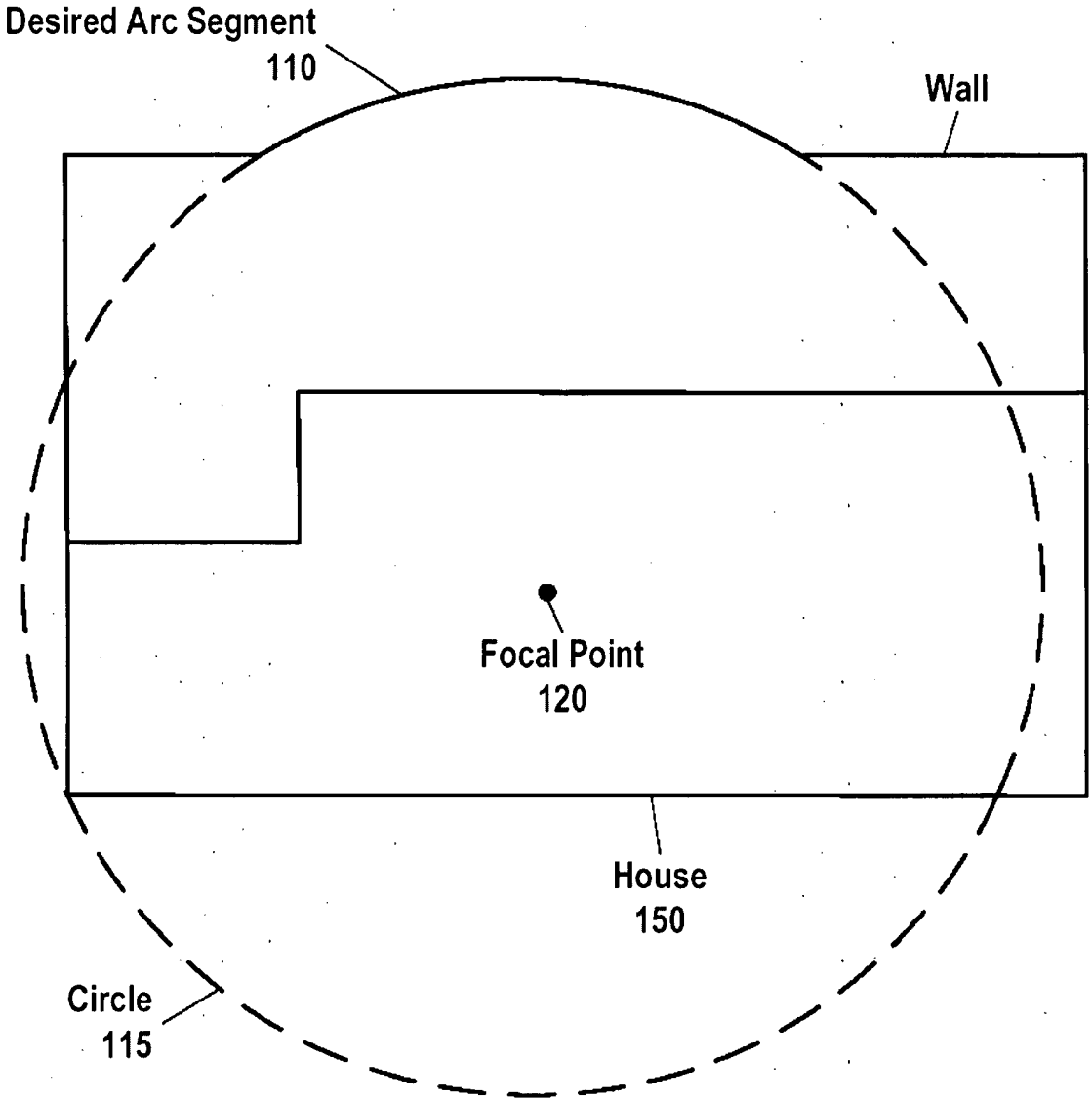

Desired Arc Segment
110
Wall
Focal Point
120
House
150
Circle
115

Fig. 1

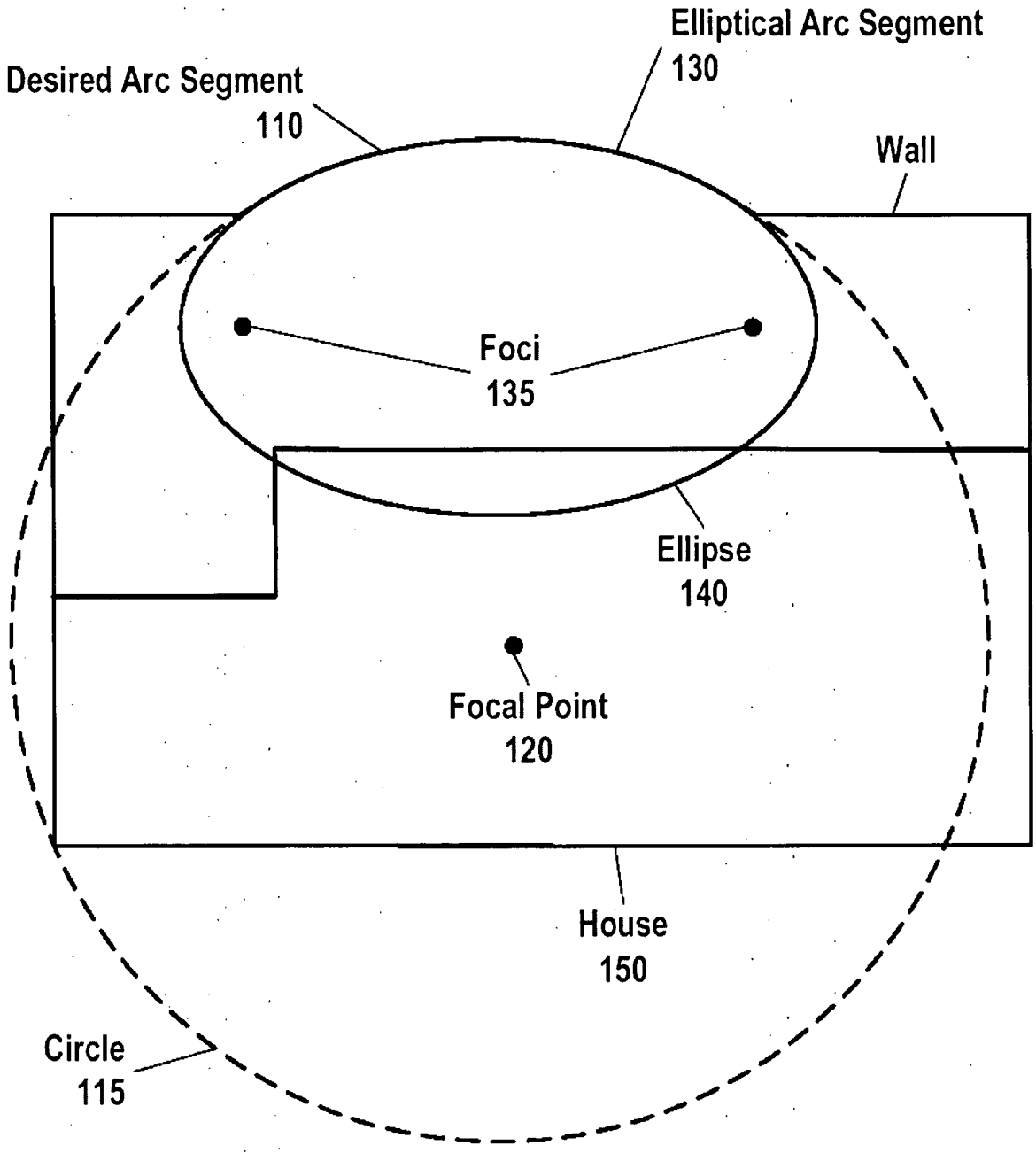

Elliptical Arc Segment
130
Desired Arc Segment
110
Wall
Foci
135
Ellipse
140
Focal Point
120
House
150
Circle
115

Fig. 2

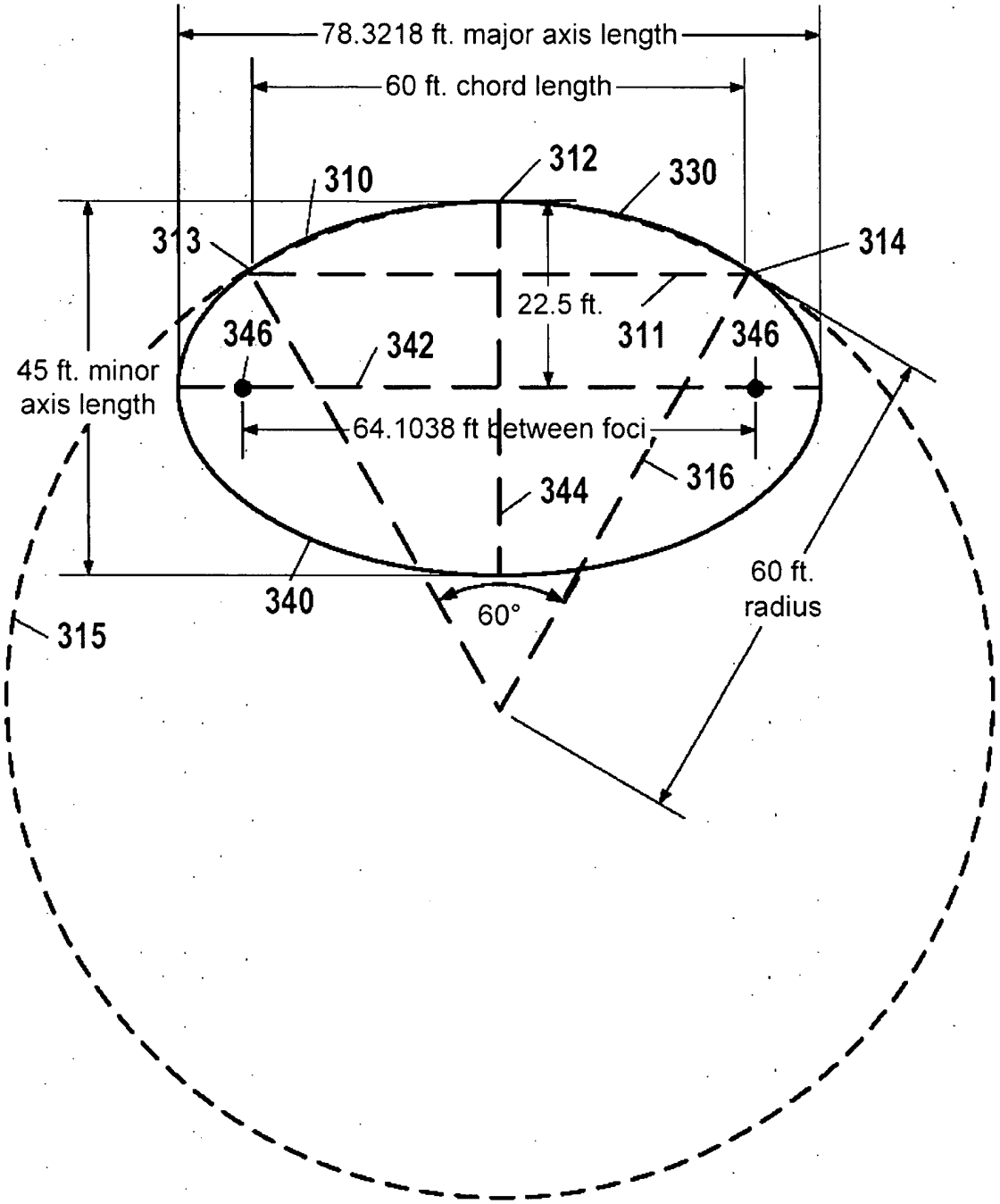

78.3218 ft. major axis length
60 ft. chord length
310
312
330
313
314
22.5 ft.
346
342
311
346
45 ft. minor
axis length
64.1038 ft between foci
316
344
340
60°
60 ft.
radius
315

Fig. 3

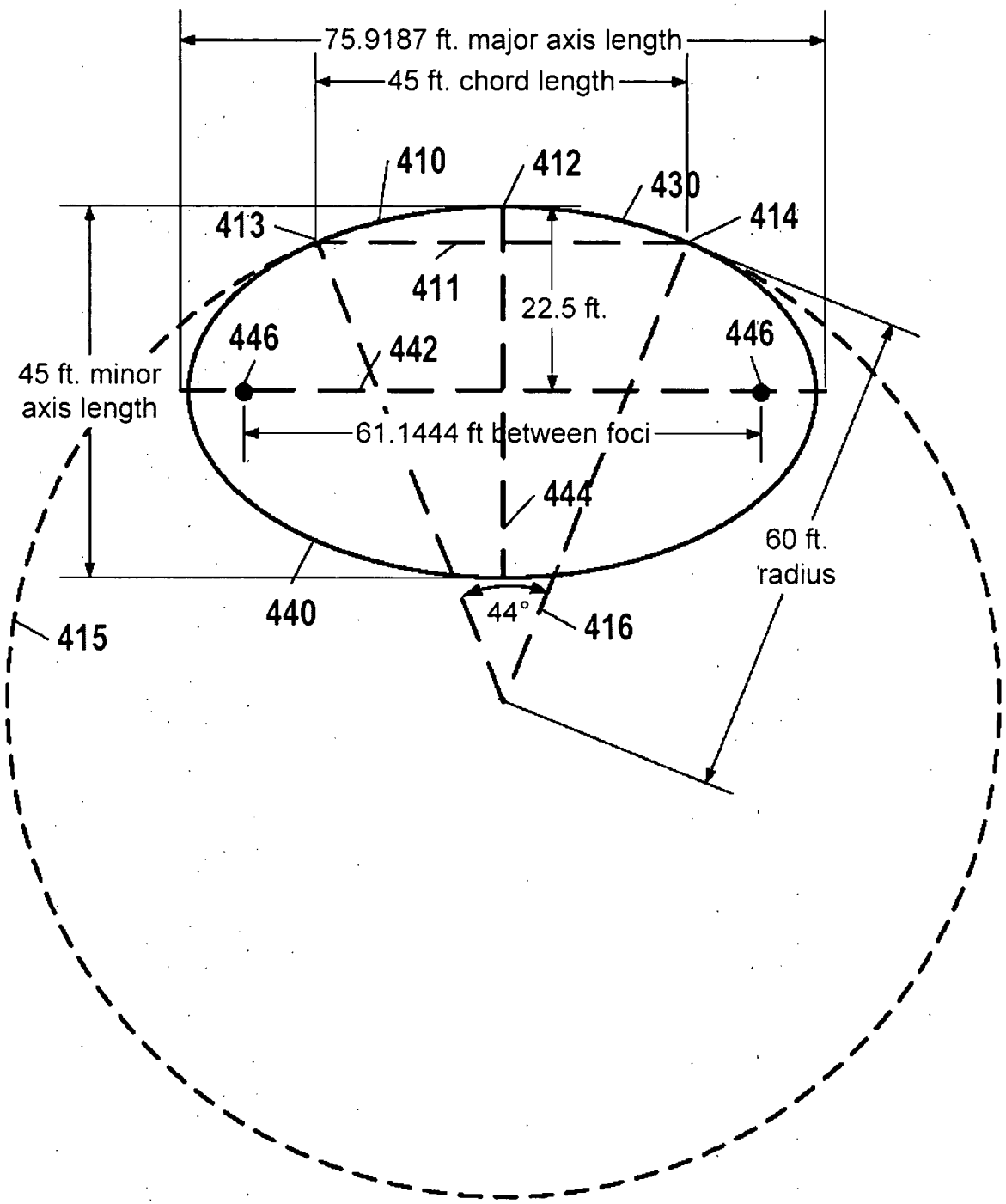

75.9187 ft. major axis length
45 ft. chord length
410
412
430
413
414
411
22.5 ft.
446
442
446
45 ft. minor
axis length
61.1444 ft between foci
444
60 ft.
radius
440
44°
416
415

Fig. 4

ELLIPTICAL COORDINATES ASSUMING CHORD LENGTH EQUALS THE RADIUS

Desired arc coordinates		Close fit elliptical coordinates			Accuracy	
radius of circle of which arc is segment	chord length	Distance from arc midpoint to baseline	Stringline length	Baseline length	+/- 64ths	+/- inches
5	5	1.875	6.5268165	5.341987797	8.73	0.14
6	6	2.25	7.8321798	6.410385357	10.47	0.16
7	7	2.625	9.1375431	7.478782916	12.22	0.19
8	8	3	10.4429064	8.547180475	13.96	0.22
9	9	3.375	11.7482697	9.615578035	15.71	0.25
10	10	3.75	13.053633	10.68397559	17.45	0.27
11	11	4.125	14.3589963	11.75237315	19.20	0.30
12	12	4.5	15.6643596	12.82077071	20.94	0.33
13	13	4.875	16.9697229	13.88916827	22.69	0.35
14	14	5.25	18.2750862	14.95756583	24.43	0.38
15	15	5.625	19.5804495	16.02596339	26.18	0.41
16	16	6	20.8858128	17.09436095	27.92	0.44
17	17	6.375	22.1911761	18.16275851	29.67	0.46
18	18	6.75	23.4965394	19.23115607	31.41	0.49
60	60	22.5	78.321798	64.10385357	104.70	1.64
100	100	37.5	130.53633	106.8397559	174.50	2.73

Fig. 5

FORMULAS USED TO COMPUTE THE ELLIPTICAL COORDINATES OF FIG. 5

Desired arc coordinates		Close fit elliptical coordinates			Accuracy	
radius	chord length	Distance from arc midpoint to baseline	Stringline length	Baseline length	+/- 64ths	+/- inches
5	=A3	=A3*0.375	=A3*1.3053633	=2*((D3/2)^2-(C3)^2)^0.5	=A3*1.745	=F3/64
6	=A4	=A4*0.375	=A4*1.3053633	=2*((D4/2)^2-(C4)^2)^0.5	=A4*1.745	=F4/64
7	=A5	=A5*0.375	=A5*1.3053633	=2*((D5/2)^2-(C5)^2)^0.5	=A5*1.745	=F5/64
8	=A6	=A6*0.375	=A6*1.3053633	=2*((D6/2)^2-(C6)^2)^0.5	=A6*1.745	=F6/64
9	=A7	=A7*0.375	=A7*1.3053633	=2*((D7/2)^2-(C7)^2)^0.5	=A7*1.745	=F7/64
10	=A8	=A8*0.375	=A8*1.3053633	=2*((D8/2)^2-(C8)^2)^0.5	=A8*1.745	=F8/64
11	=A9	=A9*0.375	=A9*1.3053633	=2*((D9/2)^2-(C9)^2)^0.5	=A9*1.745	=F9/64
12	=A10	=A10*0.375	=A10*1.3053633	=2*((D10/2)^2-(C10)^2)^0.5	=A10*1.745	=F10/64
13	=A11	=A11*0.375	=A11*1.3053633	=2*((D11/2)^2-(C11)^2)^0.5	=A11*1.745	=F11/64
14	=A12	=A12*0.375	=A12*1.3053633	=2*((D12/2)^2-(C12)^2)^0.5	=A12*1.745	=F12/64
15	=A13	=A13*0.375	=A13*1.3053633	=2*((D13/2)^2-(C13)^2)^0.5	=A13*1.745	=F13/64
16	=A14	=A14*0.375	=A14*1.3053633	=2*((D14/2)^2-(C14)^2)^0.5	=A14*1.745	=F14/64
17	=A15	=A15*0.375	=A15*1.3053633	=2*((D15/2)^2-(C15)^2)^0.5	=A15*1.745	=F15/64
18	=A16	=A16*0.375	=A16*1.3053633	=2*((D16/2)^2-(C16)^2)^0.5	=A16*1.745	=F16/64
60	=A17	=A17*0.375	=A17*1.3053633	=2*((D17/2)^2-(C17)^2)^0.5	=A17*1.745	=F17/64
100	=A18	=A18*0.375	=A18*1.3053633	=2*((D18/2)^2-(C18)^2)^0.5	=A18*1.745	=F18/64

Fig. 6

ELLIPTICAL COORDINATES ASSUMING CHORD LENGTH EQUALS 75% OF THE RADIUS

Desired Arc Coordinates		Close Fit Elliptical Coordinates			Accuracy	
radius of circle of which arc is a segment	chord length	Distance from midpoint to baseline	Stringline length	Baseline length	+/- 64ths	+/- inches
5	3.750937734	1.875	6.326558	5.0953739	2.36	0.04
6	4.501125281	2.25	7.59187	6.1144488	2.83	0.04
7	5.251312828	2.625	8.857181	7.1335236	3.30	0.05
8	6.001500375	3	10.12249	8.1525984	3.77	0.06
9	6.751687922	3.375	11.3878	9.1716732	4.25	0.07
10	7.501875469	3.75	12.65312	10.190748	4.72	0.07
11	8.252063016	4.125	13.91843	11.209823	5.19	0.08
12	9.002250563	4.5	15.18374	12.228898	5.66	0.09
13	9.75243811	4.875	16.44905	13.247972	6.13	0.10
14	10.50262566	5.25	17.71436	14.267047	6.60	0.10
15	11.2528132	5.625	18.97967	15.286122	7.08	0.11
16	12.00300075	6	20.24499	16.305197	7.55	0.12
17	12.7531883	6.375	21.5103	17.324272	8.02	0.13
18	13.50337584	6.75	22.77561	18.343346	8.49	0.13
60	45.00112503	22.5	75.9187	61.144488	28.30	0.44
100	75.01815469	37.5	126.5312	101.90748	47.17	0.74

Fig. 7

FORMULAS USED TO COMPUTE THE ELLIPTICAL COORDINATES OF FIG. 7

Desired arc coordinates		Close fit elliptical coordinates			Accuracy	
radius	chord length	Distance from arc midpoint to baseline	Stringline length	Baseline length	+/- 64ths	+/- inches
5	=A3/1.333	=A3*0.375	=A3*1.3053633	=2*((D3/2)^2-(C3)^2)^0.5	=A3*1.745	=F3/64
6	=A4/1.333	=A4*0.375	=A4*1.3053633	=2*((D4/2)^2-(C4)^2)^0.5	=A4*1.745	=F4/64
7	=A5/1.333	=A5*0.375	=A5*1.3053633	=2*((D5/2)^2-(C5)^2)^0.5	=A5*1.745	=F5/64
8	=A6/1.333	=A6*0.375	=A6*1.3053633	=2*((D6/2)^2-(C6)^2)^0.5	=A6*1.745	=F6/64
9	=A7/1.333	=A7*0.375	=A7*1.3053633	=2*((D7/2)^2-(C7)^2)^0.5	=A7*1.745	=F7/64
10	=A8/1.333	=A8*0.375	=A8*1.3053633	=2*((D8/2)^2-(C8)^2)^0.5	=A8*1.745	=F8/64
11	=A9/1.333	=A9*0.375	=A9*1.3053633	=2*((D9/2)^2-(C9)^2)^0.5	=A9*1.745	=F9/64
12	=A10/1.333	=A10*0.375	=A10*1.3053633	=2*((D10/2)^2-(C10)^2)^0.5	=A10*1.745	=F10/64
13	=A11/1.333	=A11*0.375	=A11*1.3053633	=2*((D11/2)^2-(C11)^2)^0.5	=A11*1.745	=F11/64
14	=A12/1.333	=A12*0.375	=A12*1.3053633	=2*((D12/2)^2-(C12)^2)^0.5	=A12*1.745	=F12/64
15	=A13/1.333	=A13*0.375	=A13*1.3053633	=2*((D13/2)^2-(C13)^2)^0.5	=A13*1.745	=F13/64
16	=A14/1.333	=A14*0.375	=A14*1.3053633	=2*((D14/2)^2-(C14)^2)^0.5	=A14*1.745	=F14/64
17	=A15/1.333	=A15*0.375	=A15*1.3053633	=2*((D15/2)^2-(C15)^2)^0.5	=A15*1.745	=F15/64
18	=A16/1.333	=A16*0.375	=A16*1.3053633	=2*((D16/2)^2-(C16)^2)^0.5	=A16*1.745	=F16/64
60	=A17/1.3333	=A17*0.375	=A17*1.3053633	=2*((D17/2)^2-(C17)^2)^0.5	=A17*1.745	=F17/64
100	=A18/1.333	=A18*0.375	=A18*1.3053633	=2*((D18/2)^2-(C18)^2)^0.5	=A18*1.745	=F18/64

Fig. 8

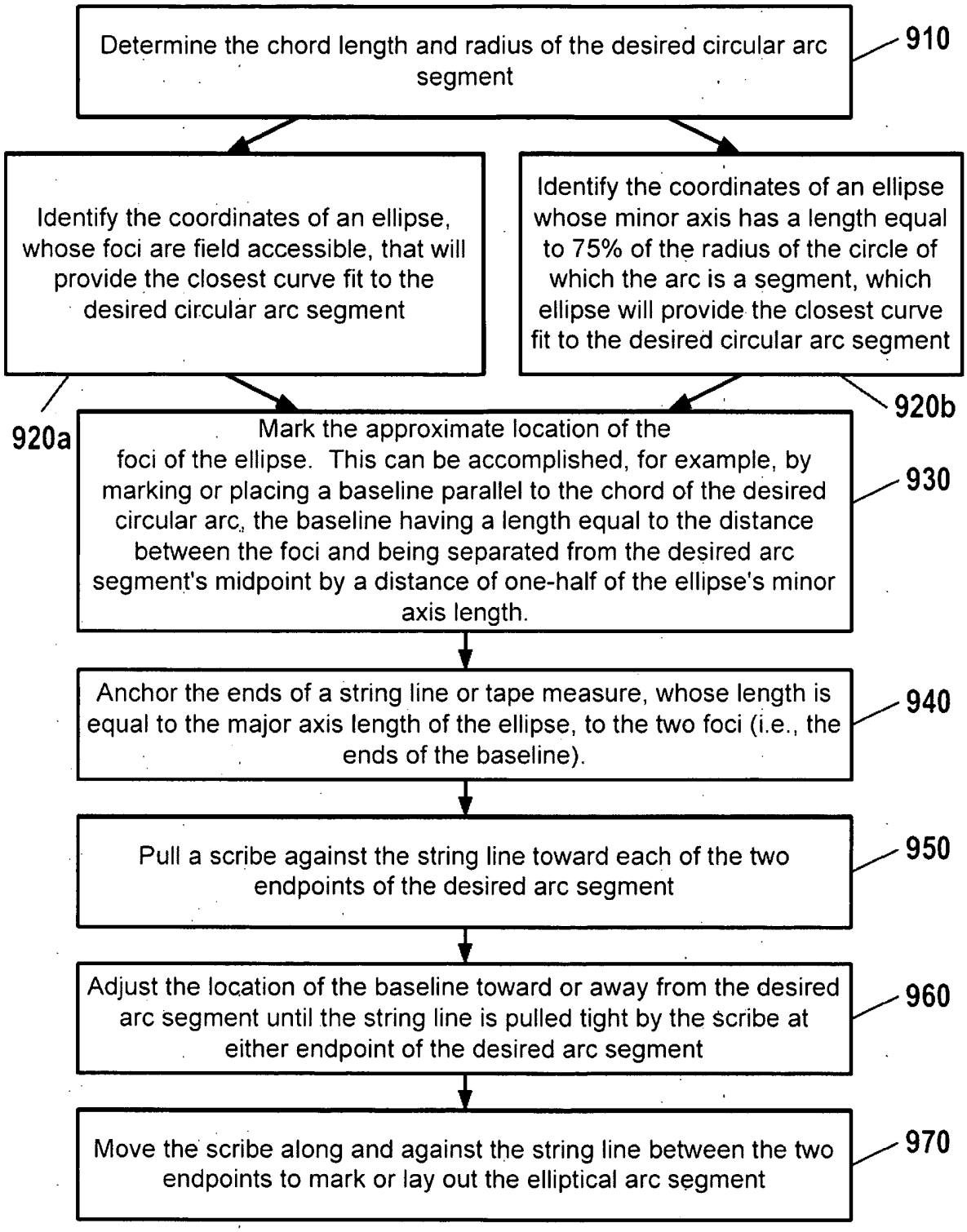

Determine the chord length and radius of the desired circular arc segment
910
Identify the coordinates of an ellipse, whose foci are field accessible, that will provide the closest curve fit to the desired circular arc segment
Identify the coordinates of an ellipse whose minor axis has a length equal to 75% of the radius of the circle of which the arc is a segment, which ellipse will provide the closest curve fit to the desired circular arc segment
920a
920b
Mark the approximate location of the foci of the ellipse. This can be accomplished, for example, by marking or placing a baseline parallel to the chord of the desired circular arc, the baseline having a length equal to the distance between the foci and being separated from the desired arc segment's midpoint by a distance of one-half of the ellipse's minor axis length.
930
Anchor the ends of a string line or tape measure, whose length is equal to the major axis length of the ellipse, to the two foci (i.e., the ends of the baseline).
940
Pull a scribe against the string line toward each of the two endpoints of the desired arc segment
950
Adjust the location of the baseline toward or away from the desired arc segment until the string line is pulled tight by the scribe at either endpoint of the desired arc segment
960
Move the scribe along and against the string line between the two endpoints to mark or lay out the elliptical arc segment
970

Fig. 9

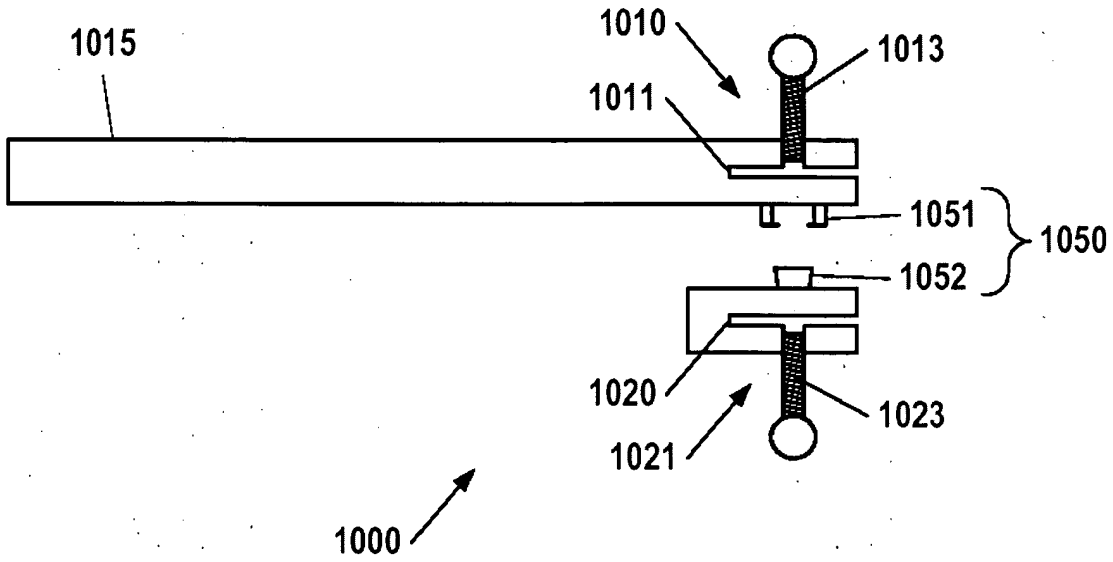


Fig. 10

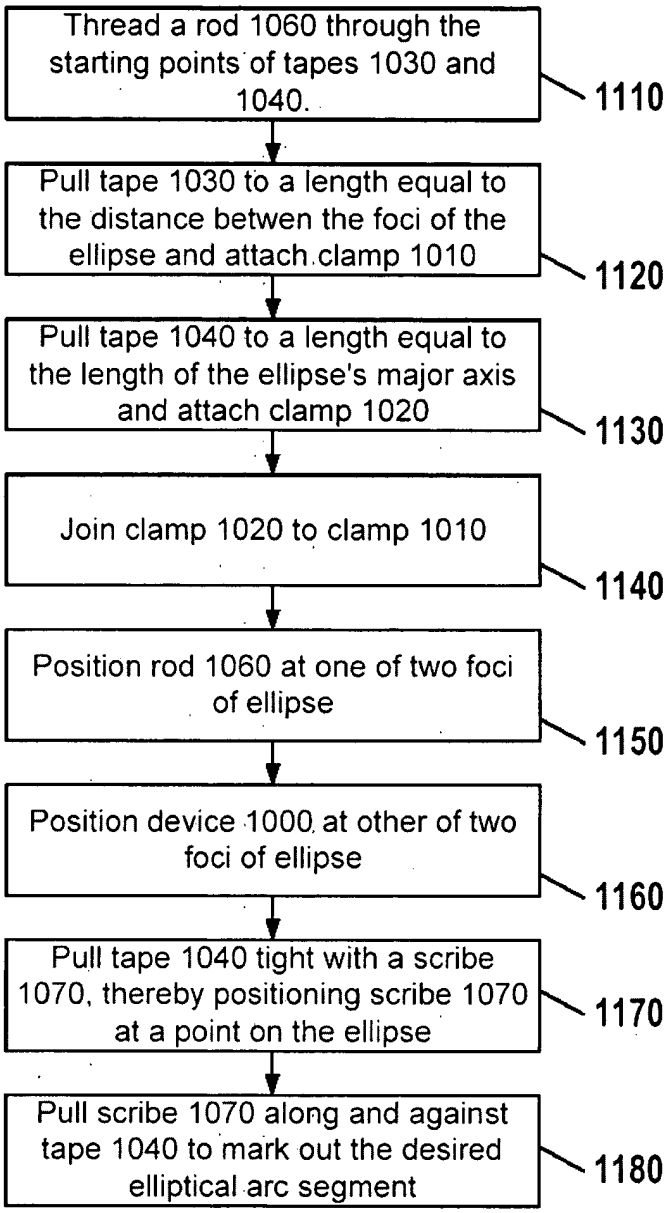


Fig. 11

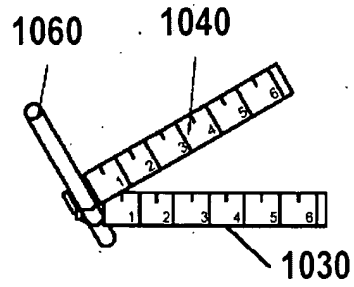


Fig. 12

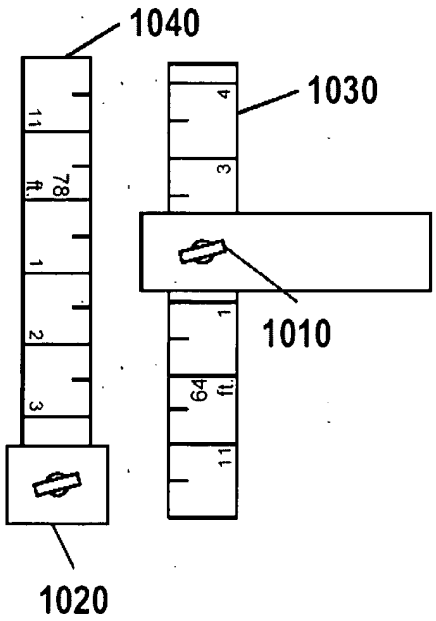
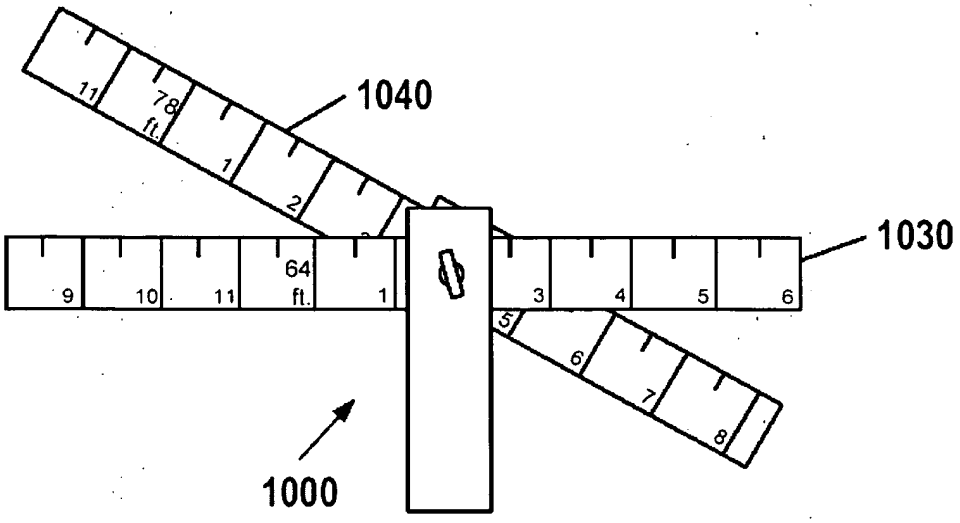


Fig. 13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1030
1000
11
78
ft.
1
2
9
10
11
64
ft.
1
3
4
5
6
5
6
7
8

Fig. 14

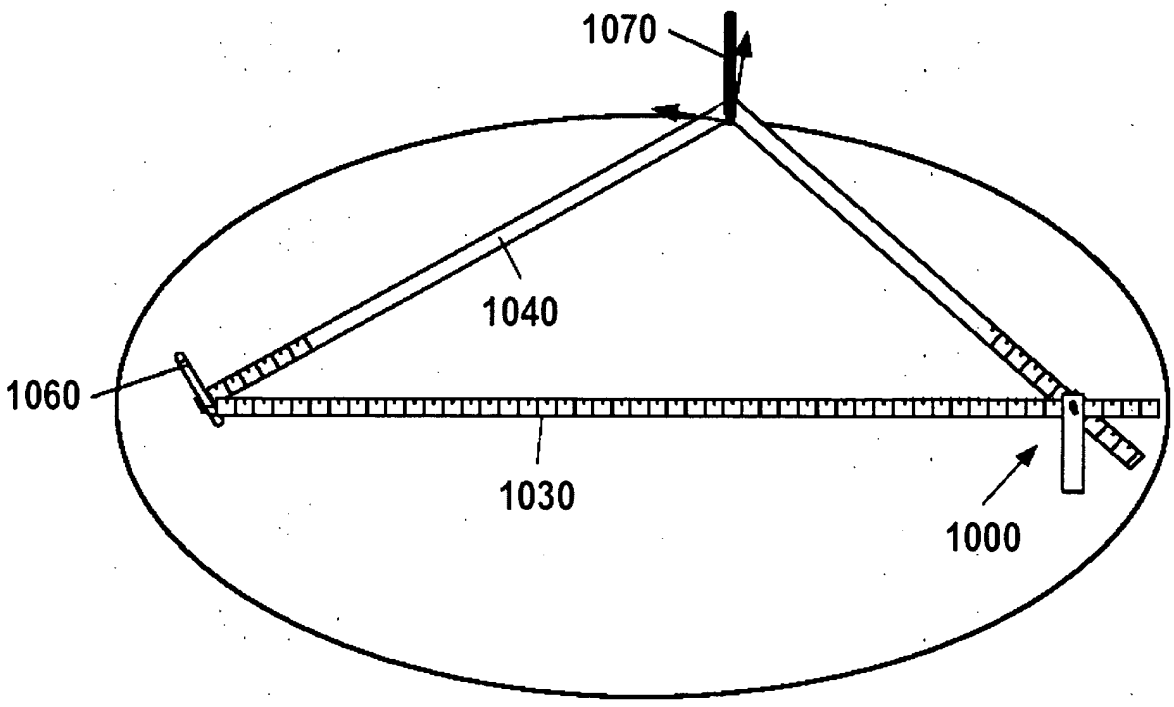
1070
1040
1060
1030
1000

Fig. 15